

MANAGEMENT OF FOOD ALLERGIES IN CHILDREN IN SOUTH AFRICA – DETERMINING ASPECTS OF THE KNOWLEDGE AND PRACTICES OF DIETITIANS AND MEDICAL PRACTITIONERS

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ABSTRACT

Rationale. Adverse reactions to food are frequently suspected in daily clinical practice yet evidence on knowledge of health-care workers regarding correct diagnosis and management remains limited. Few studies have assessed knowledge and management approaches of food allergies by medical practitioners and none exists for dietitians. There is also limited information as to whether current approaches conform to evidence-based recommendations, particularly with regard to dietary intervention and allergy prevention strategies. This survey attempted to determine aspects of food-allergy-related knowledge and practices of medical practitioners and dietitians.

Methodology. An analytical cross-sectional study design was adopted. Participants, randomly selected from the three provinces with the largest populations in South Africa ($N = 660$), were categorised as general practitioners (GP), dietitians (DT) or medical specialists (SP). They completed a validated (face and content validity) quantitative questionnaire which explored aspects of food allergy diagnosis and management.

Results. Limited knowledge existed among the professional groups studied regarding appropriate diagnosis, dietary intervention and allergy prevention strategies. Inappropriate alternative diagnostic methods, such as immunoglobulin G (IgG) and antigen leukocyte cellular antibody testing (ALCAT), were being used in practice. Of the medical practitioners performing food challenges, 95% had resuscitation training but only 70% of them had appropriate resuscitation equipment available. Health-care practitioners reported use of concomitant complementary therapy and DT were not consulted for nutritional management of patients. Lengthy food avoidance practices were advocated in infants, regardless of the presence of atopy, and in pregnant and lactating women. For allergy treatment, recommended feeds were not in line with evidence-based guidelines with over a third of all respondents choosing breastfeeding with

extensive maternal food avoidance and the use of numerous inappropriate infant formulas. The average (standard deviations (SD)) age recommended for introduction of solid foods was 5 (1.3) months. No guidance for implementing elimination diets was given to patients by more than half of medical practitioners and a third of DT. Only 15% of respondents did child growth assessment and monitoring. Of all respondents, 98% believed they needed more education and training in food allergy management, more than 50% had no knowledge of specialist allergy units and 99% recognised a need for South African-specific 'best-practice' guidelines.

Conclusion. The study highlighted a need for better education and training in food allergy management, at undergraduate and postgraduate level, with particular focus on diagnosis, dietary management and prevention strategies. Nutritional and prevention strategies were not evidence-based. Findings could contribute to creating a platform for achieving minimum competency levels in allergy care and provide motivation for establishing South African-based guidelines, allergy support networks and better public awareness.

INTRODUCTION

Food allergy is an important public health problem that affects both adults and children. The prevalence of allergies appears to have increased worldwide despite difficulties in obtaining firm population-based data.¹⁻⁴ Although the exact incidence of childhood food allergies in South Africa remains uncertain, the perception of specialist allergy units across the country is of an overall increase in allergy patients over the last decade.⁵

In spite of the fact that adverse reactions to food are frequently suspected in daily clinical practice, knowledge of food allergies, the mechanisms involved, food allergens, diagnosis and dietary intervention remains poor among health professionals. A lack of standardised diagnostic procedures and approach to specific management exists.^{3,6,7} As a result of these shortfalls, allergy organisations around the world are developing 'best-practice' clinical guidelines, based on the most recent scientific evidence, for the diagnosis and management of food allergy. The most current of these includes the 'Guidelines for the Diagnosis and Management of Food Allergy in the United States' developed by the National Institute of Allergy and Infectious Diseases (NIAID)-Sponsored Expert Panel.^{8,9}

Primary and secondary health-care facilities, general practitioners, paediatricians or consultants in other specialties, with little or no allergy training, tend to be the first points of contact for patients suffering from food allergies.⁷ Limited basic allergy knowledge and expertise from these health-care professionals, as well as few allergy consultants available for referral, may result in poor or inappropriate intervention, use of medications and elimination diets, as well as potential self-

diagnoses by parents and reliance on complementary and alternative therapies.^{3,7}

The primary modality of treatment for food hypersensitivity remains appropriate avoidance of the causal food allergen/s by means of a strict but nutritionally adequate elimination diet. Success of the elimination diet is dependent upon the accurate diagnosis and identification of the allergens followed by thorough nutritional input by a dietitian and regular reassessment. Unnecessary or incorrectly implemented elimination diets due to misdiagnosis, may lead to a number of complications in children including malnutrition and growth retardation; inappropriate and continued food avoidance despite negative food challenges has been associated with feeding difficulties.¹⁰

We live in an environment of information excess and although one would expect patients and their parents to be better informed, incomplete and confusing messages from often unreliable sources have left many seeking answers from sources outside the consultation rooms of conventional health-care practitioners.¹¹ Dietary misconceptions and outdated dietary advice regarding food allergy continue to be advocated by the media, complementary medicine practitioners and health-care professionals alike, often at the expense of the patient and family's quality of life.^{11,12} Inappropriate referral and collaboration between health-care professionals including dietitians (DT) could also negatively affect optimal nutritional intervention. In South Africa poor nutritional status and financial constraints affect a large proportion of young children, including those with food allergies, which would further compound the problem.¹³

Currently in South Africa there is no specialisation for medical practitioners or DT in the field of allergy and food allergy.¹⁴ Medical and dietetic students alike receive very little allergy education.¹⁴ A paucity of information exists in the country to assess current allergy care and compare it with the most recent scientifically based recommendations for diagnosis, management and prevention of food allergies. The primary aim of this study was to determine aspects of food-allergy-related knowledge and current approaches of medical practitioners and DT managing children with food allergy in the three provinces with the largest population in South Africa.

METHODOLOGY

This was an analytical, cross-sectional study.

Participants were selected from the three provinces with the largest populations in South Africa, Gauteng,

Western Cape and KwaZulu-Natal ($N = 660$). They had to be currently working in South Africa, be registered with the Health Professions Council of South Africa (HPCSA) and treat children with allergic symptoms in their practice. Practitioners most likely to treat and manage children with food allergy were chosen, based on the disease expressions often seen in childhood food allergies and thus the different medical and nutritional care that may be required. These included general practitioners (GP), dietitians (DT) and medical specialists (SP) most likely to treat children with food allergy symptoms (paediatricians, gastroenterologists, dermatologists, ear, nose and throat specialists and practitioners with a diploma in allergy, obtained from the Colleges of Medicine of South Africa) (Table I).

Random selection was made from the HPCSA name-base (2008) according to region, by means of proportional stratified (profession and specialty) random selection. The total number of participants ($N = 376$) was selected on the basis of selecting a Bernoulli proportion with a precision of 5% from a total population of 17 343 health professionals (N). The final sample size was oversampled by 75% to accommodate an estimated possible drop-out or non-response rate similar to that seen in the pilot study, $N = 660$.

A validated quantitative questionnaire was compiled to explore aspects of basic allergy knowledge, food allergy diagnosis and management, including dietary intervention and prevention strategies. Six members of the Allergy Society of South Africa (ALLSA) Executive Committee and three registered DT with a special interest in food allergy, evaluated the questionnaire content. They considered its level of difficulty, its appropriateness for assessing basic allergy knowledge, minimum competency levels for the selected health professionals, and its comprehensiveness to meet the study objectives. The final questionnaire was adjusted according to appropriate recommendations. The questionnaire was further piloted to establish face validity. For this purpose, medical practitioners and DT attending the annual ALLSA Congress (2008) were requested to complete the questionnaire and comment on the level of understanding and points of weakness. Twenty in all responded (15 medical practitioners, 5 DT) and the questionnaire was adapted to improve flow and ensure a better understanding of some questions as appropriate. The final questionnaire consisted of seven sections, relating to aspects in food-allergy knowledge, diagnosis, management and prevention of food allergies, collaboration between health-care practitioners, problem areas in allergy care and opportunities for education and training.

Table I. Total numbers of health practitioners randomly selected from the HPCSA name-base* and those who participated in the study (according to region and profession)

Health professionals	Gauteng		KwaZulu-Natal		Western Cape		Grand total	
	HPCSA	STUDY	HPCSA	STUDY	HPCSA	STUDY	HPCSA	STUDY
Dietitians	23	5	6	3	14	5	43	13
General medical practitioners	265	18	136	12	150	17	551	47
Specialists total	30	8	13	6	23	8	66	22
GRAND TOTAL							660	82
Specialist/paediatrics	6	2	4	4	7	3	17	9
Specialist/dermatology	3	2	2	0	3	0	8	2
Specialist/otorhinolaryngology (ENT)	5	0	2	1	3	2	10	3
Specialist/gastroenterology	13	2	4	1	8	2	25	5
Specialist/allergy diploma[†]	3	2	1	0	2	1	6	3

*Source: Health Professions Council of South Africa (HPCSA) Jan 2008

[†]Information obtained from Allergy Society of South Africa (ALLSA) 2008

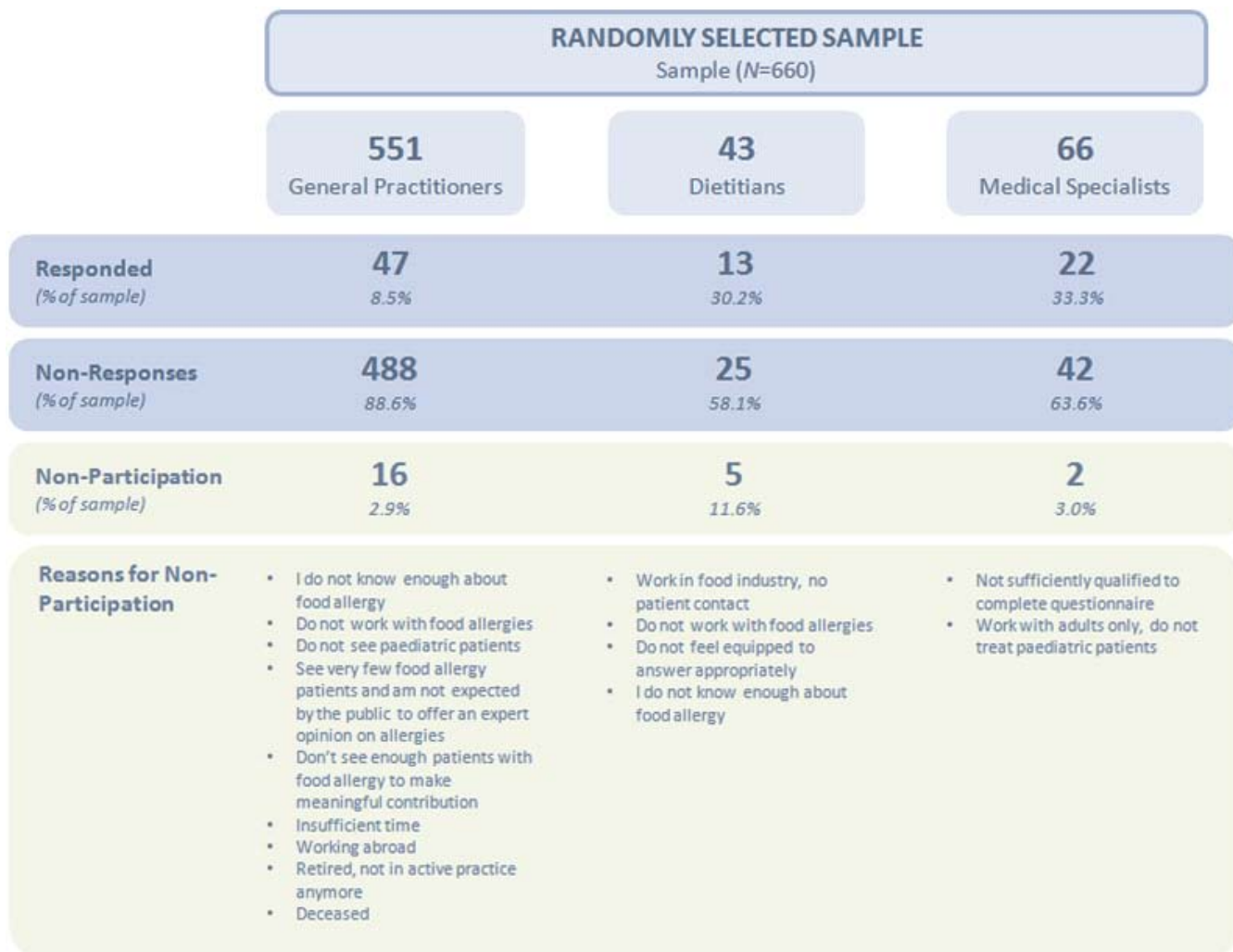


Fig. 1. Diagram to illustrate questionnaire responses and non-participation per professional category.

Questionnaires were sent via post and email to all respondents in an attempt to reach as many as possible. Participants were requested to complete the questionnaire and return it to the researcher by email or in the post by means of a self-addressed, stamped envelope included with the questionnaire. The allocated time frame for responding was 8 weeks. A reminder via post and email was sent out. In an attempt to obtain more responses, the deadline was extended by a further 5 weeks. Another reminder was emailed and posted to the selected individuals.

Data analyses

Questionnaires were numerically precoded to protect the participant anonymity. Only the researcher had access to personal information, all of which remained confidential. The researcher was responsible for checking the questionnaires, coding them and capturing the data into Excel spreadsheets. There were non-responses and blank questionnaires returned which were not used. No incomplete questionnaires were received from those who participated. Reasons for non-participation in the study were obtained and recorded.

For descriptive purposes, frequency tables, histograms, means and standard deviations were calculated. To compare different categories, cross tabulation with the maximum likelihood (ML) chi-square test were performed on categorical responses. Non-parametric analysis of variance (ANOVA) techniques were used for ordinal responses, e.g. Kruskal-Wallis test, Mann-Whitney test, Bonferroni multiple comparison procedure. Statistika 9 was used to analyse data.

Ethics approval was obtained from the University of Stellenbosch, Faculty of Health Sciences Committee of Human Research (NO8/02/030).

RESULTS

Of the total of 660 randomly selected potential participants (Fig. 1), 82 health professionals participated in the survey – 8.5% of GP ($N = 47/551$), 33% of SP ($N = 22/66$) and 30% of DT ($N=13/43$). The study was designed for 5% precision but the poor response meant the overall precision for estimating a proportion with a 95% confidence interval was 10.8%.

All the DT (100%, $N = 13$) were members of the Association for Dietetics in South Africa (ADSA), 60% of GP ($N = 28$) and 68% of SP ($N = 15$) were members of the South African Medical Association (SAMA). Only 12% of all respondents were affiliated to the Allergy Society of South Africa (ALLSA) – no GP or DT; 45% SP ($N = 10$) (ML chi-square test; $p < 0.001$). Subscription to the ALLSA journal differed significantly – 10.6% of GP ($N = 5$), 45% of SP ($N = 10$) and no DT (ML chi-square test; $p = 0.0036$).

Education and training

The average years in practice of all respondents was 14.6 (standard deviation (SD) = 9.4) years. Health practitioners in practice for longer were less likely to have received allergy training. As many as 98% of respondents (GP 97.8% ($N = 46$), DT 100% ($N = 13$), SP 95.4% ($N = 21$)) believed additional allergy education and training would be beneficial (ML chi-square test;

$p = 0.61$). Continued professional development activities (ML chi-square test; $p = 0.079$), workshops ($p = 0.02$), and journal articles (ML chi-square test; $p = 0.046$) were considered the best modes of providing education to professionals. Ninety-nine per cent of respondents ($N = 81$) thought there was a need for standardising allergy care and developing South Africa-specific evidence-based consensus guidelines (ML chi-square test; $p = 0.57$).

Collaboration between medical practitioners and dietitians

A large proportion of medical practitioners did not consult DT for nutritional management (72% GP ($N = 34$) and 45% SP ($N = 10$)). A significant difference was found between GP and SP who referred food allergy patients to DT and those who did not (ML chi-square test; $p = 0.049$). There was also a significant difference between those medical practitioners being referred to by DT or not (ML chi-square test; $p = 0.02$).

Only 6.2% of the two medical categories (GP and SP) 'referred every patient' to a DT ($N = 4$); 23% 'only referred patients with multiple food allergies' ($N = 16$); 22% 'never referred' to a DT and implemented his/her own diet plan ($N = 15$); 26% 'hardly ever' referred ($N = 18$) and 22% wanted to but 'didn't know whom to refer to' ($N = 15$). DT reported 'never' working with doctors in 46% of cases ($N = 6$), 'occasionally' in 38% of cases ($N = 5$) and 15% ($N = 2$) reported working with a doctor 'for every patient'.

Diagnosis

Up to one-third of both GP and DT did not know atopic dermatitis and food allergy were associated (ML chi-square test; $p = 0.0009$). Of the SP, neither of the dermatologists ($N = 2$) acknowledged a positive association between atopic dermatitis and food allergy in infants and young children.

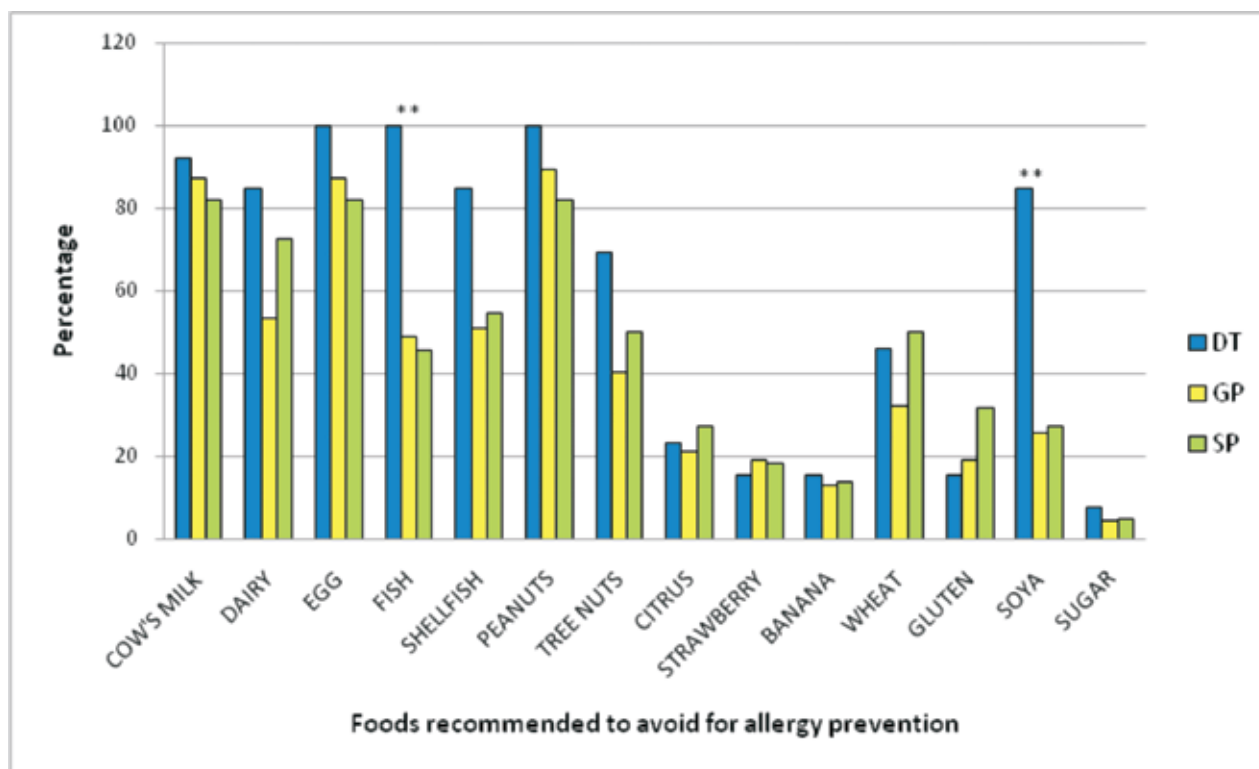
SP were most likely to use a combination of methods

when diagnosing food allergy, including patient history, diet history, skin-prick test, serum specific IgE and food-elimination-challenge testing. Of the medical practitioners performing food challenges (11 GP, 9 SP), 19 had had resuscitation training (95%) but only 14 of them (70%) had appropriate resuscitation equipment available (5 GP, 9 SP) (ML chi-square test; $p = 0.004$). In terms of unreliable tests, 23% of SP ($N = 5$) and 19% of GP ($N = 9$) used IgG testing in practice to diagnose non-IgE-mediated food allergy while 6% of GP ($N = 3$) used the antigen leukocyte cellular antibody test (ALCAT). All health practitioners reported high use of complementary therapy with alternative testing methods by patients 'prior to' (53%, $N = 44$) and 'while using' (43%, $N = 35$) conventional medicine.

Allergy prevention strategies

Food avoidance in high-risk infants, pregnant and lactating women

Almost half of all the health professionals (46%, $N = 38$) advised extensive and lengthy food avoidance, from older than 6 months of age, in high-risk infants (i.e. allergic disease in atopic parents or siblings) for allergy prevention. The foods recommended for avoidance by 50% or more from each group of practitioners included cow's milk, dairy, egg, peanut and shellfish. There was a significant difference regarding advice for avoidance of fish and soya between the three categories of practitioners (ML chi-square test; $p < 0.001$ and $p < 0.001$ respectively) with DT more likely to advise avoidance of these two foods. The mean (SD) number of months advised for specific allergen avoidance in high-risk infants, were significant for dairy (11 (3.9), Kruskal Wallis test; $p = 0.050$), wheat (10 (4), Kruskal Wallis test; $p = 0.05$) and soya (10 (3.9), Kruskal Wallis test; $p = 0.01$) with a significant trend for cow's milk (11 (3.8), Kruskal Wallis test; $p = 0.07$), egg (12 (4.5), Kruskal Wallis test; $p = 0.09$) and citrus (9 (2.5), Kruskal Wallis test; $p = 0.07$) (Fig. 2). The DT appeared to recommend food allergen



DT – dietitian, GP – general practitioners, SP – medical specialists

** Differences per professional category statistically significant (ML chi-square test) (fish $p < 0.001$, soya $p < 0.001$).

Fig. 2. Foods advised to be eliminated in high-risk infants for allergy prevention.

avoidance for the longest period of time per food for allergy prevention in infants without clinical allergy.

Approximately three-quarters of all participants reported their current practice was to advise pregnant women to avoid specific foods for allergy prevention – 77% GP ($N = 36$), 85% DT ($N = 11$), 73% SP ($N = 16$). Peanut avoidance was recommended by 50% or more respondents from each group (GP 66% ($N = 31$), DT 85% ($N = 11$) SP 68% ($N = 15$)) (ML chi-square test; $p = 0.39$). Thirty-one per cent of DT ($N = 4$) recommended soya be avoided (ML chi-square test; $p = 0.001$). A significant difference was also found with regard to elimination of tree nuts (GP 36% ($N = 17$), DT 69% ($N = 9$), SP 9% ($N = 2$), ML chi-square test; $p = 0.001$) The time frame of avoidance for all the foods by the three categories of practitioners was 9 months, i.e. the duration of the pregnancy (77%, $N = 63$).

Food avoidance was recommended to breastfeeding mothers, regardless of the allergic clinical picture of the infant, by a near statistically significant number of respondents (78.7% GP ($N = 37$), 92.3% DT ($N = 12$) and 59% SP ($N = 13$), ML chi-square test; $p = 0.06$). The majority of participants (50% or more from each group of practitioners) recommended the avoidance of cow's milk and dairy, egg and peanuts. Recommendations for dietary elimination while breastfeeding were found to be significantly different for fish (ML chi-square test; $p = 0.002$), shellfish (ML chi-square test; $p = 0.019$), tree nuts (ML chi-square test; $p < 0.001$) and soya (ML chi-square test; $p = 0.003$). The time period recommended most frequently by all participants for specific food avoidance during lactation (76%, $N = 62$) was found to be 12 months.

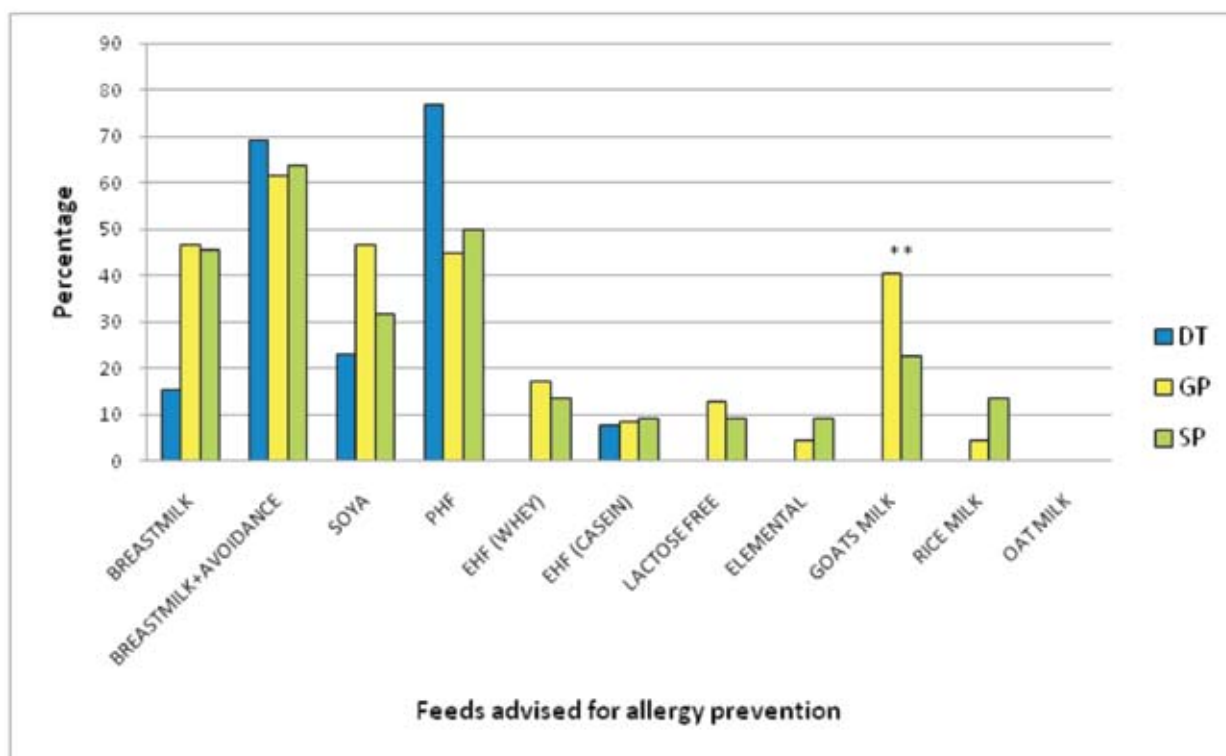
Infant feeding recommendations

With regard to recommendations of various feeds for allergy prevention, no significant differences were found except in the case of goat's milk (ML chi-square test; $p = 0.002$). Up to 40% of GP ($N = 19$) and 23% of SP

($N = 5$) advised goat's milk as an appropriate breast milk substitute for allergy prevention. Only 15% of DT ($N = 2$) recommended breast milk, without maternal dietary avoidance, as an appropriate infant feed for allergy prevention. The majority of all respondents (63%, $N = 52$) advised breast milk, with maternal dietary avoidance of common food allergens (cow's milk, egg, peanut, tree nut, soya, fish, shellfish and wheat). Partially hydrolysed infant formula was considered by 77% of DT ($N = 10$). Soy infant formula was recommended by 23% of DT ($N = 3$), 32% of SP ($N = 7$) and 47% of GP ($N = 22$). Fourteen per cent of SP ($N = 3$) recommended rice milk as an appropriate breast milk alternative in high-risk infants (Fig. 3).

Infant feeding advice

Feeds for the treatment of a specific food allergy, e.g. cow's milk allergy, recommended by over a third of all the health care practitioners, included breast milk, with maternal dietary avoidance of all common food allergens (not only specific problem foods) (78%, $N = 64$), soya infant formula (56%, $N = 46$), partially hydrolysed infant formula (38%, $N = 31$), extensively hydrolysed whey infant formula (40%, $N = 33$), elemental infant formula (32%, $N = 26$) and goat's milk (34%, $N = 28$). Significant differences were found with regard to extensively hydrolysed casein dominant infant formula (ML chi-square test; $p = 0.017$), lactose-free formula (ML chi-square test; $p = 0.008$), elemental infant formula (ML chi-square test; $p = 0.002$), goat's milk (ML chi-square test; $p < 0.001$) and oat milk (ML chi-square test; $p = 0.016$). Goat's milk was recommended for treatment of food allergy by nearly half of the GP group (47%, $N = 22$) as well as 27% of SP ($N = 6$). Almost a quarter of DT recommended rice milk (23%, $N = 3$) and oat milk (23%, $N = 3$) as an appropriate breast milk substitute and 17% of GP ($N = 8$) recommended a lactose-free infant formula (cow's milk-based) in infants with a confirmed food allergy (Fig. 4).



PHF – partially hydrolysed formula, EHF – extensively hydrolysed formula, DT – dietitians, GP – general practitioners, SP – medical specialists

** Differences per professional category statistically significant (ML chi-square test) (goat's milk $p = 0.002$)

Fig. 3. Infant feeds recommended for allergy prevention per professional category.

Approximately 54% of all participants (53% GP ($N = 25$), 54% DT ($N = 7$) and 55% SP ($N = 12$)) (ML chi-square test; $p = 0.91$) thought colic-like symptoms may 'always' be related to food allergy requiring dietary intervention. Breast milk, with maternal dietary restriction of all common food allergens, was recommended for treatment of colic by most DT (69%, $N = 9$) and SP (59%, $N = 13$) while GP recommended soya infant formula (70%, $N = 33$) (ML chi-square test; $p = 0.004$). Partially hydrolysed infant formula was recommended by 51% of GP ($N = 24$), 41% of SP ($N = 9$) and 54% of DT ($N = 7$). Almost half the respondents from each group (47% GP ($N = 22$), 45% SP ($N = 10$) and 46% DT ($N = 6$)) recommended a lactose-free infant formula for infants with colic-like symptoms. Goat's milk was recommended by 40% of GP ($N = 19$) and 32% of SP ($N = 7$) (ML chi-square test; $p = 0.003$). An elemental formula was advised by 31% of DT ($N = 4$) while 18% of SP ($N = 4$) recommended rice milk to manage colic symptoms.

Introduction of solid foods

The average (SD) age recommended by all three categories for introduction of solid foods was 5 (1.3) months ($p = 0.04$). All the DT ($N = 13$) recommended solid foods be introduced from '6 months' while the medical practitioners were more likely to advise introduction of solid foods at '4 months' (GP 28%, $N = 13$ and SP 32%, $N = 7$) and at '6 months' (GP 38%, $N = 18$ and SP 27%, $N = 6$). Early and late introduction of solids was also advised by the medical practitioner groups – 6% before 4 months of age (2% GP, $N = 1$ and 18% SP, $N = 4$) and 16% after 6 months (21.3% GP, $N = 10$ and 14% SP, $N = 3$).

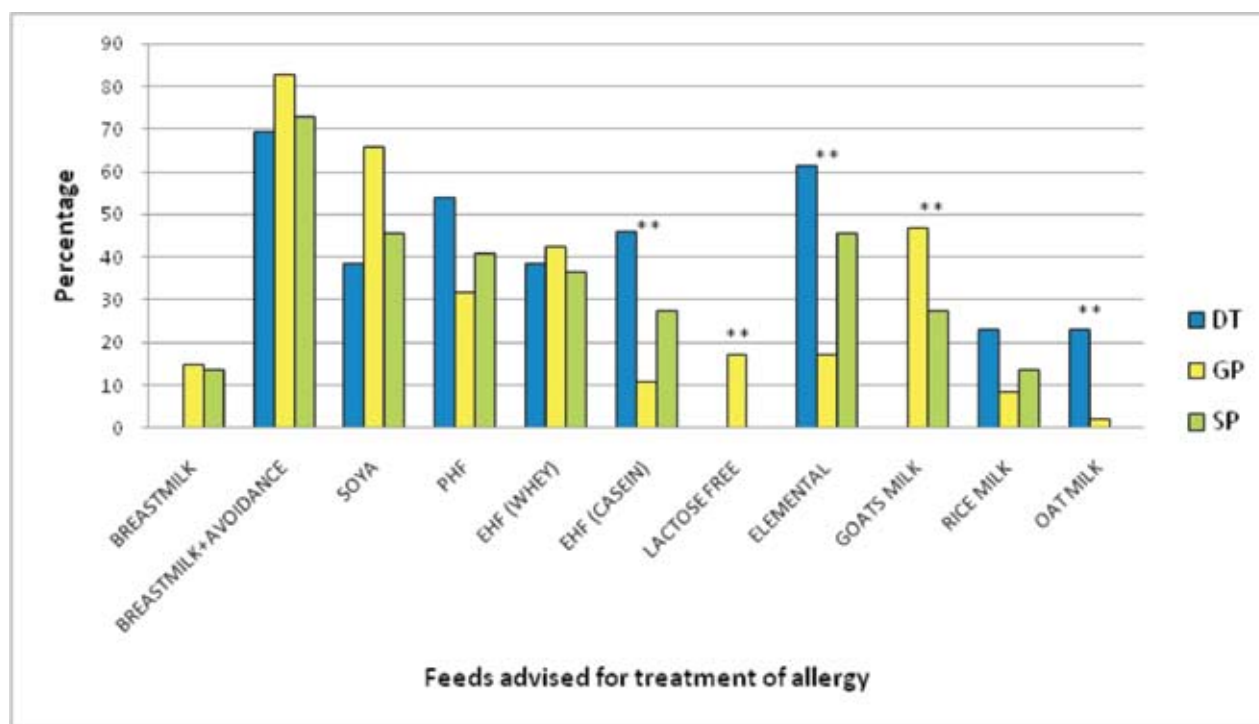
In high-risk infants, without clinical food allergy, extensive food avoidance of all common allergens (cow's milk, egg, wheat and gluten, shellfish, fish, peanuts, tree nuts, soya) was advocated for the first 12 months by 76% of health professionals. Between 20% and

30% advised avoidance of shellfish, tree nuts and peanuts for up to 24 months. Recommendations for introduction of the following foods were significant among the three categories: cow's milk (Kruskal-Wallis test; $p < 0.01$), soya (Kruskal-Wallis test; $p < 0.01$), peanuts (Kruskal-Wallis test; $p = 0.02$), tree nuts (Kruskal-Wallis test; $p < 0.01$) and gluten (Kruskal-Wallis test; $p = 0.04$), while there was a significant trend for shellfish (Kruskal-Wallis test; $p = 0.08$) and egg ($p = 0.06$).

Children presenting with confirmed food allergy were advised to avoid all the major food allergens for up to 12 months by most respondents (50% or more). More professionals advocated avoidance of certain allergens up to 24 and 36 months for these children, namely peanuts, tree nuts, shellfish and egg. Recommendations for introduction of the following foods were found to be significantly different among the three categories: soya (Kruskal-Wallis test; $p < 0.01$), tree nuts (Kruskal-Wallis test; $p < 0.01$) and wheat (Kruskal-Wallis test; $p = 0.02$), while gluten showed a significant trend (Kruskal-Wallis test; $p = 0.06$).

Guidance and education for implementing elimination diets

Appropriate information and education considered necessary for food allergy patients and their parents to ensure good adherence to elimination diets was poor from all three categories. No guidance or information for implementing an elimination diet was given to patients by 53% of GP ($N = 25$), 55% of SP ($N = 12$) and 31% of DT ($N = 4$). As a group, the DT provided more appropriate information overall; however the extent of this guidance and support was very limited. Only 23% gave recipe suggestions ($N = 3$) and information regarding food labels ($N = 3$) and 8% ($N = 1$) advised on coping strategies for various situations and occasions. They were also the group most likely to give diet sheets (whether their own or with the help of an allergy software programme) to patients – 61.5% ($N = 8$) com-



PHF – partially hydrolysed formula, EHF – extensively hydrolysed formula, DT – dietitians, GP – general practitioners, SP – medical specialists

** Differences per professional category statistically significant (ML chi-square test) (EHF-casein dominant $p = 0.017$, lactose-free formula $p = 0.008$, elemental infant formula $p = 0.002$, goat's milk $p < 0.001$ and oat milk $p = 0.016$)

Fig. 4. Infant feeds recommended for treatment of food allergy by professional category.

Table II. Problems areas in food allergy care identified by health-care professionals

Problem identified in allergy care	GP % (N)	SP % (N)	DT % (N)	Total % (N)
Lack of training and education*	51 (24)	41 (9)	77 (10)	52 (43)
Limited allergy expertise and support [†]	21 (10)	32 (7)	38 (5)	27 (22)
Few dietitians, confident to manage food allergy, to refer to	19 (9)	32 (7)	46 (6)	27 (22)
Limited specialist allergy clinics (long waiting lists)	19 (9)	14 (3)	31 (4)	20 (16)
Special feeds and alternative foods – expensive and not easily available [‡]	19 (9)	14 (3)	38 (5)	21 (17)
Rural areas – limited services/ resources [§]	13 (6)	18 (4)	31 (4)	17 (14)
Primary health care – limited services/resources**	13 (6)	0	15 (2)	10 (8)
Public ignorance and poor patient knowledge	9 (4)	27 (6)	0	12 (10)

* Limited personal expertise with regards to diagnosis and management; insufficient education and training at both undergraduate and post-graduate levels

[†] Limited number of allergy specialists and clinics for guidance and appropriate referral

[‡] Financial constraints and limited accessibility to appropriate alternatives leads to poor patient adherence to strict diets

[§] With regard to medical and dietetic allergy expertise; availability of diagnostic tests, appropriate feeds and food alternatives; access to epinephrine auto-injectors

** With regard to medical and dietetic allergy expertise; availability of diagnostic tests, appropriate specialised feeds

pared with only 6% GP (N = 3) and 22.7% SP (N = 5) (ML chi-square test; $p < 0.001$).

Growth assessment and monitoring

Only 15% of all respondents (N = 12) did growth assessment and monitoring of food allergic children – 6.4% of GP (N = 3), 22.7% of SP (N = 5) and 30.7% of DT (N = 4) (ML chi-square test; $p = 0.04$). Among all three categories, the time period for follow-up was most frequently described as '*Just when there are problems and the patient returns*' – 42.6% GP (N = 20), 15.4% DT (N = 2), 27.3% SP (N = 6). More than a quarter of all respondents (27%, N = 22) '*Never*' followed up a food allergy patient on a restriction diet – 27.7% GP (N = 13), 31% DT (N = 4) and 23% SP (N = 5).

Problem areas in allergy care

More than 50% of the health professionals were unaware of specialist allergy clinics in South Africa [66% GP (N = 31), 69% DT (N = 9), 22.7% SP (N = 5), ML chi-square test; $p = 0.001$]. Table II shows the problems experienced by the various health professionals in managing food allergy in South Africa.

The overall approach to allergy care by medical practitioners and DT in South Africa was not in line with the latest evidence-based guidelines and recommendations for allergy management and prevention (Tables III and IV).

DISCUSSION

In interpreting the data, the poor response unfortunately limits the statistical power of the study and its relevance to the rest of the population. Against the current paucity of such data, the study did, however, provide useful insights into gaining a better understanding of how medical practitioners and DT approach their management of food allergy in children. Areas of concern for providing better education and training were identified, such as correct diagnosis, food allergy prevention strategies and dietary intervention, as well as appropriate referral among health professionals. The findings are useful as a point of reference, particularly in the South African context, as to the type of food allergy care provided by a number of different health professionals and whether such care practices are in accordance with evidence-based approaches.

Possible reasons for the poor response rate may include

the questionnaire which may have attempted to assess too many different areas of knowledge and practices. In this regard, '*Time constraints*' was included as a reason for not responding and although the questionnaire had been formatted to allow for easy answering, the length of time to complete it (15-20 minutes) may have been a limiting factor. A mixed mode strategy (mail and web surveys) had been used for the survey in order to exploit the advantages of web surveys and minimise non-responses,¹⁵ as well as to reach as many individuals as possible with limited Internet access. Unfortunately, in addition to the length of the questionnaire, limited computer adeptness or a wariness to use the Internet by some individuals may have further contributed to the poor response rate.

The question of a general lack of interest may have also been a contributory factor to the low response. It is possible that only a few medical practitioners and DT have a real interest in food allergy. On the other hand, perhaps only those with strong opinions about the topic cared to respond. Also, a lack of response may indicate an overall lack of confidence in managing food allergy patients. One of the reasons given by non-responses was '*I don't know enough about food allergy*'. This is an important insight in itself. Many health practitioners may have avoided responding so as not to implicate their current approaches and expose a limited knowledge or poor and outdated clinical practices. Although anonymity had been emphasised at the outset of the study, those selected for the survey may still have had a concern about revealing their own knowledge and practice methods and the questionnaire may have been construed as a critical assessment of professional capabilities or lack thereof.

Another shortcoming of the study was that it did not include all the provinces in South Africa and focused on the three provinces with the greatest population numbers. This decision for the design of the study was influenced by financial constraints and limited resources but the main rationale was the fact that these areas were the best resourced in terms of allergy care. Two of the provinces (Gauteng and Western Cape) are predominantly urban. Allergic sensitisation^{16,17} and prevalence of allergic disease have been found to be significantly lower in rural as opposed to urban areas,¹⁶⁻¹⁹ and it was therefore assumed that in these areas, more expertise would be available to manage allergic disorders. It was hypothesised that should problems exist in these provinces with regard to knowledge and management

of food allergy, training and education and availability of expertise and resources, by implication, they would also exist within the other provinces where even less allergy care is available to the public.

The study did not make clear distinctions between different work environments such as private and public health care as well as urban and rural areas. Based on the feedback from the respondents on 'support structures', the availability of '*limited dietary and allergy expertise*' was considered a problem, and was experienced specifically by those in rural areas and the public health-care centres in South Africa.

The literature confirms that GP, paediatricians and specialists in other fields of medicine tend to be the first points of contact for many patients suffering from food allergies, yet allergy education and training is not offered in many training programmes.^{7,20-23} This study highlighted the need for better allergy education and training at both undergraduate and postgraduate level (98% of respondents).

The other issue identified by respondents as a problem area in providing appropriate care was the '*limited availability of resources and allergy expertise*'. There is a paucity of allergy expertise in South Africa.¹⁴ A large proportion of health professionals (particularly GP and DT) were unaware of specialist allergy clinics in South Africa. There are centres of excellence for allergy care in South Africa; however, these will not be appropriately utilised if health professionals do not know of their existence. Patients with allergic symptoms and suspected food allergy tend to initially consult a GP or DT for management²⁴ but as shown in the study, an understanding of suitable allergy care is limited within the various professions. It is essential that these categories of health-care professionals understand when to refer the

patient to a specialist and where the expertise can be found. Insufficient allergy expertise and the importance for establishing appropriate care structures is recognised worldwide,²⁴⁻²⁸ and as such South Africa is not an exception.¹⁴

In 2010, an expert panel sponsored by the National Institute of Allergy and Infectious Diseases published guidelines for diagnosing and managing food allergies in the USA. The guidelines combine existing scientific knowledge with clinical expert opinion to generate recommendations for use by health-care professionals.^{8,9} Almost all the respondents in our survey (99%) felt that evidence-based guidelines for managing food allergies in South Africa and better support structures were necessary and would be beneficial. A more standardised approach to allergy care based on current scientific evidence and in line with guidelines published internationally, but also specific to South Africa's unique situation, would help instil confidence in health practitioners. It could provide a platform to develop minimum levels of competency and ensure consistent, better quality care. This in turn would provide reassurance in conventional medicine from the patient's point of view.

An accurate diagnosis of food allergy is extremely important not only to limit overdiagnosis and misdiagnosis but also to avoid subjecting patients to expensive and potentially unnecessary diagnostic procedures and therapies.²⁹ A finding of concern in our study was that unproven and unreliable diagnostic methods were being used in practice by a number of medical practitioners to diagnose non-IgE-mediated food reactions in particular (23% SP and 19% GP use IgG testing and 6% GP do ALCAT testing). Neither of the tests have been shown to have any predictive value in the diagnosis of allergy and intolerances.²³ They are expensive, result in misdiagnosis and patients become disillusioned with conven-

Table III. Approach to food allergy prevention and treatment by health professionals in South Africa compared with current recommendations

Allergy preventive strategy	Approach being practised in South Africa	2008 AAP* Recommendations
Diet of high-risk infants	Avoidance of all common food allergens until 1 year, especially cow's milk, egg, peanuts, soya, fish, wheat and shellfish	Lack of evidence for avoiding common food allergens for allergy prevention
Pregnancy avoidance	Avoid common food allergens for duration of pregnancy (9 months) especially peanuts, soya, fish and shellfish	Lack of evidence – avoidance unlikely to reduce risk of developing allergies; may adversely affect maternal and fetal nutrition
Avoidance of allergens during lactation	Avoidance of common food allergens for at least 9 months regardless of atopy in infant	Some evidence for reduced atopic dermatitis. Special avoidance diets not recommended unless specific allergy identified
Breastfeeding 'exclusively' – for how long?	Poor breastfeeding promotion. Breastfeeding encouraged with food allergen avoidance for prevention	Exclusive for 3-4 months; continue until 4-6 months while introducing solid foods
Infant feeding – breast milk substitutes for prevention	Poor knowledge of appropriate feeds. Goat's milk, soy formula and cow's milk based lactose-free feeds recommended. Extensively hydrolysed whey and elemental feeds	Compared with whole cow's milk protein, evidence for certain extensive hydrolysates (casein) and partial hydrolysates; not cow's milk, soy, goat's milk or elemental formula
Introduction of solid and complementary foods – when and what?	Doctors still advising before 4 months and after 6-7 months. Allergenic foods still being advised for extended periods, e.g. cow's milk – 12 months, eggs – 24 months, peanuts – 36 months	Evidence to wait 4-6 months; lack of convincing evidence for avoidance of specific allergenic foods beyond 6 months if no confirmed allergic disease

*AAP - American Academy of Pediatrics

tional medicine. They can also lead to unwarranted restriction of important nutrients from the diets of infants and children.³⁰ Furthermore, the use of complementary and alternative therapies has implications not only for the health-care system and health policy but is also associated with considerable costs to the patient.³¹⁻³³ A large number of patients seen by our study population had sought alternative therapies for diagnosis and management of the allergic condition 'prior to' (53%) seeking conventional treatment and 43% of all respondents believed their patients were using complementary and alternative treatments 'in conjunction' with their conventional medical care. Considering the large number of medical practitioners and DT shown in our survey to be providing inconsistent information and care, and the use of unreliable diagnostic tests in some medical practices, it can be assumed that the problem of patients seeking alternative approaches will continue unless the issue is addressed.

Approximately 40% of infants and young children with atopic dermatitis (AD) have food allergy.³⁴ Food allergies in AD patients induce eczematous dermatitis and contribute to severity of disease in some patients.³⁵ Appropriate exclusion of certain food allergens from the patient's diet can therefore lead to significant clinical improvement.^{36,37} Despite the recognised link between AD and food allergy, a large number of medical

practitioners (26% GP and 27% SP) in our study did not acknowledge this. Almost one-third of both GP (28%) and DT (31%) did not know that the two conditions are linked. These opinions could adversely impact effective treatment and management, as well as appropriate referral across disciplines, of infants and children who present with eczema.

Our study supported the literature that there are still a number of nutritional misconceptions being practised by both DT and medical practitioners.¹² Avoidance of the most common food allergens was still part of everyday practice for allergy prevention in high-risk infants, regardless of clinical allergy, and in both pregnant and lactating women. Current consensus is that this practice is both inappropriate and not evidence-based.^{9,38-44} Early, gradual exposure of foods in small and incremental amounts, first *in utero* and then through breastfeeding and introduction of solid foods (appropriate variety at the critical age) is considered necessary to induce oral tolerance.^{45,46} Breastfeeding plays an important role in immune modulation and early exposure to food allergens,⁴⁵ yet it was not the feed of choice for the majority of health professionals. All three categories of health-care professionals demonstrated a poor knowledge regarding appropriate infant formulas and breast milk substitutes for allergy prevention and treatment and the management of colic. Breastfeeding promo-

Table IV. Summary of important findings of this study

Key finding	Medical practitioners	Dietitians
Inappropriate infant feeds recommended for allergy treatment and prevention	Goat's milk recommended as a breast milk substitute for allergy prevention and treatment. Soy formula for allergy prevention and treatment	Poor advice regarding appropriate choices. Limited promotion of breastfeeding for allergy prevention. Soy formula for allergy prevention and treatment
Feeds for treatment of colic	Breast milk with food avoidance, soy, partial hydrolysate, extensive hydrolysate (whey or casein), elemental formula, lactose-free (cow's milk based), goat's milk and rice milk	Breast milk with food avoidance, soy, partial hydrolysate, extensive hydrolysate (whey or casein), elemental formula, lactose-free (cow's milk based)
Inappropriate dietary advice	Restriction of common food allergens for allergy prevention in high-risk infants, pregnant and lactating women. Early (<4 months) and late (>6 months) introduction of solids. Late inclusion of common allergens into infant's diet	Restriction of common food allergens for allergy prevention in high-risk infants, pregnant and lactating women. Late inclusion of common allergens into infant's diet. Lack of knowledge and confidence to implement a balanced elimination diet in infants and children
Use of alternative and complementary therapies	Use of alternative and complementary therapies by patients prior to and in conjunction with conventional medicine	Use of alternative and complementary therapies by patients prior to and in conjunction with dietary management
Use of alternative diagnostic methods	IgG* and ALCAT [†] testing	
Oral food challenge testing	Lack of resuscitation training and equipment	
Patient follow-up	Poor, infrequent patient follow-up and re-evaluation	Poor, infrequent patient follow-up and re-evaluation
Nutritional assessment, growth monitoring	Poor nutritional assessment and growth monitoring	Poor nutritional assessment and growth monitoring
Dietary information and guidance for patient	Limited or no information provided for successful and balanced food elimination	Limited or no information provided for successful and balanced food elimination
Multidisciplinary collaboration	Limited referral to dietitians	Limited communication and working with medical practitioners
Support	Limited knowledge of specialist allergy units	Limited knowledge of specialist allergy units

* IgG – immunoglobulin G

[†] ALCAT – antigen leukocyte cellular antibody test

tion without avoidance of certain foods, was found to be poor among all the health professionals, most surprisingly the DT group. Current consensus regarding infant soy formula is that it should be avoided in healthy and high-risk infants for atopy prevention and is not recommended for treatment of cow's milk allergy (unless IgE-mediated cow's milk allergy has been identified and financial constraints of the patient warrant its use).^{38,40,41,47-50} A number of respondents in this survey inappropriately recommended soya infant formula for both prevention and treatment (60% and 50% of total, respectively) of food allergy. Elemental formulas are recommended for treatment of cow's milk and multiple food allergies but not for prevention of food allergies.^{9,51,52} SP and GP advised the use of elemental formulas (4% and 9% respectively) for allergy prevention, a practice which is not evidence-based.⁵² Goat's milk is inappropriate for preventing and treating cow's milk allergy and is considered nutritionally unsuitable as a breast-milk substitute for infants⁵³⁻⁵⁵ yet it was still being advocated by GP and SP in our study for prevention (40% and 23%, respectively) and treatment (47% and 27%, respectively) of food allergy. Rice and oat milk were inappropriately recommended by SP (14% recommended rice milk for prevention and treatment) and DT in particular (23% recommended both rice milk and oat milk for treatment). These milks are not nutritionally adequate for feeding an infant (whether as a sole source or major source of nutrition).⁵⁶ They should only be considered as a cow's milk substitute in children older than a year, when given in appropriate amounts in combination with a nutritionally balanced diet.⁵⁶ In a country where nutritional deficits and financial constraints are commonplace these incorrect recommendations could be detrimental to patients in terms of providing inappropriate nutrition and unsuitable, expensive alternatives.

Complementary feeding (i.e. solid foods and liquids other than breast milk or infant formula and follow-on formula) should not be introduced before 17 weeks and not later than 26 weeks according to recent ESPGHAN recommendations.⁴² There is no convincing scientific evidence that avoidance or delayed introduction of potentially allergenic foods, such as cow's milk, fish and eggs, reduces allergies, either in infants considered at increased risk for the development of allergy or in those not considered to be at increased risk. It is also considered prudent to continue breastfeeding while gradually introducing potentially allergenic foods in increasing quantities to an infant's diet.^{38-42,57-59} In our study, all the DT recommended introduction of complementary foods at 6 months of age which is in line with WHO recommendations.⁴² A number of GP and SP advised either early (<4 months) or delayed introduction of solid foods (>6 months) despite the evidence confirming this may contribute to the development of allergy.⁴² Also, common allergens (cow's milk, egg, wheat, gluten, shellfish, fish, peanuts, tree nuts, soya) were generally restricted in high-risk infants by all three categories of professionals, regardless of clinical evidence of allergic disease, for the first 12 months of age. Between 20% and 30% advised avoidance of shellfish, tree nuts and peanuts for up to 24 months. Again, these are not evidence-based approaches.

It would be helpful in future to determine current approaches to dietary management compared to evidence-based guidelines for the whole of South Africa, with specific inclusion of rural and urban areas, private and public health-care sectors. This should include medical practitioners, DT and other health professionals closely involved in the monitoring of infants and young children and the dissemination of information to parents and caregivers, such as clinic sisters and nurses. Other useful research would be to evaluate allergy knowledge

and approach to management of newly qualified medical practitioners and DT prior to and after implementing a better food allergy training programme.

CONCLUSION

Despite the study's low response rate, the insights from this study are helpful in understanding the standard of allergy care and intervention being provided to patients and their parents by a number of GP, SP and DT in South Africa. The study highlighted a need in South Africa for better education and training in the field of food allergy particularly with regard to diagnosis, interpretation of tests, allergy prevention and dietary management. The study affirmed the problem of a limited number of allergy specialists within the South African health-care system. There also appears to be poor communication between medical practitioners and DT with poor cross-referral and limited collaboration between the disciplines in effectively managing patients suffering from food allergies, requiring balanced restriction diets. Findings could contribute to creating a platform for achieving minimum competency levels in allergy care and provide motivation for establishing South African-based guidelines, allergy support networks and better public awareness.

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Declaration of conflict of interest

The authors declare no conflict of interest.

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